THE PHILIPPINE ISLANDS

FOREST RESOURCES

in the

PANAMA PACIFIC INTERNATIONAL EXPOSITION SN. FRANCISCO CALIFORNIA

FOREST RESOURCES OF THE PHILIPPINES

TIMBER

Area.—The virgin forests of the Philippine Islands cover approximately 40,000 square miles, about equal to the area of the State of Kentucky. This is about one-third of the total area of the Archipelago. In addition there are estimated to be about 20,000 square miles of second-growth forest which will yield large quantities of firewood and some small-sized timber. Taken together, the virgin and second-growth forests of the Philippines cover an area about equal to that of the State of New Mexico.

Ownership.—More than 99 per cent of the timber belongs to the Philippine Government and is under the administrative control of the Bureau of Forestry. Less than 1 per cent of the timber is held under sure title of private ownership.

Composition.—About 70 per cent of all Philippine timber belongs to the dipterocarp family, which is generally found in stands which are almost pure from the lumberman's point of view. The largest individuals of this family reach 200 feet in height and some specimens have a diameter of 7 feet. This family is by far the most important, as it furnishes the main bulk of the timber cut in the Philippines. About a dozen botanically distinct species furnish probably 80 per cent of the entire cut. From the standpoint of the lumberman, however, this number can be reduced to three groups, namely, the lauans, apitongs, and yacals.

Yacals.—This group comprises trees locally known as yacal, narig, mangachapuy, and dalingdingan. The timbers are hard and durable and are more plentiful than the other very durable commercial woods of the Islands.

Apitongs.—The apitong group comprises timbers known as apitong, panao, hagachac, and guijo. The first three are marketed under the name of apitong. Guijo is generally considered somewhat superior. Well-seasoned timbers of this group weigh between 40 and 50 pounds per cubic foot.

Lauans.—It is in this group that the main wealth of the Philippine forests lies. It comprises timbers locally known as white lauan, red lauan, almon, balacbacan, bagtican, mayapis, tiaong, and tanguile. For the sake of simplicity, they may be divided into two classes, namely, the white and red lauans. Export grades of the red lauans are used in Europe and America as substitutes for mahogany, and are frequently

sold as such. While not so hard and durable as mahogany, lauan has a beautiful grain and permits of a very fine polish.

The main bulk of the forests produces timbers of comparatively few kinds and in some instances approaches pure stands of one or two grades. It is estimated on an average that 70 to 80 per cent of all the dipterocarp forests will yield timbers that belong to the groups described above.

Leguminosae.—Next in importance to the dipterocarp family are the leguminosae, or locust family, to which a number of the commercially important cabinet woods of the Philippines belong. Among the principal representatives of this family are narra, tindalo, ipil, supa, acle, and banuyo. No finer hardwoods are found anywhere in the world.

Stand.—The average stand in the virgin forests of the Philippines may be roughly estimated to run 6,000 board feet per acre and over. On some of the tracts now being worked under long-term license agreements (or concessions as they are popularly called) the stands run between 15,000 and 35,000 board feet per acre. Stands of 45,000 to 60,000 board feet per acre are not infrequent, principally at elevations between 800 and 1,200 above sea level.

Obtaining a tract of timber.—The public forests of the Philippines are not sold, but are developed under a license system. Small operators usually work under ordinary yearly licenses for definite small areas. Exclusive licenses, or concessions as they are popularly called, are generally in the form of a twenty-year exclusive license to cut and extract timber and other forest products from a specified tract. The land itself is in no way affected by such a license, merely the timber and minor forest products are included.

When a lumberman seriously considers an investment in the Philippines he himself or an experienced representative should state to the Director of Forestry approximately the extent of the investment he contemplates. He will then be given information about several tracts which promise to answer his needs, and arrangements can be made for an experienced forester to accompany him over the tracts in question so that he can size up conditions for himself. All maps, estimates, and other detailed information which may have been collected on the tract will, of course, be placed at his disposal, and he can count upon the heartiest governmental coöperation and assistance in making a success of his enterprise. It should be understood, however, that in no case does the Director of Forestry guarantee the correctness of the estimates or other data which he furnishes. These are given to the applicant for what they are worth, and in every case he is advised to take such steps as may

be necessary to satisfy himself as to whether or not they are correct. If the lumberman then decides to apply for the concession, he makes a formal application in writing to the Director of Forestry for an exclusive twenty-year privilege for the tract he has selected. His application is then forwarded by the Director of Forestry with recommendations to the Secretary of the Interior. He may then approve the issuance of an exclusive license, if he decides that such a course is in the public interest. For an area of more than 1,000 hectares (approximately 2,500 acres) proposals for bids to secure the desired privilege are published in the Official Gazette and other papers. At least six weeks intervene between the appearance of the first advertisement and the opening of the bids, but in order to give interested parties in the Philippines ample time to correspond with their principals in Europe or America this period is usually extended to about four months. The advertisement states the amount of capital which must be invested within a given time, the minimum cut during the several succeeding years, together with certain requirements regarding logging and milling equipment, etc.

Formal bids are finally submitted and the license will be granted to the bidder who gives the best assurances of developing the tract most thoroughly and promptly. The right to reject any and all bids is expressly reserved. The areas thus granted as concessions are generally of sufficient extent to permit operations for a considerably longer time than the period for which they are granted, and thus the logger and millman in making his investment may expect to operate not merely for twenty years, the limit expressed in his license agreement, but almost for an indefinite period. In fixing the annual production there is taken into consideration so far as possible the amount of overmature timber on the stand and the amount of annual increment, with the object of rendering the investment a permanent one instead of merely permitting the operator to strip and abandon the area he holds. In preparing regulations under which the operator is required to work, first care is given to the future condition of the area in order that the land after logging may be potentially as valuable as before, and no consideration of immediate profit is allowed to interfere. Nevertheless, the logger in the Philippines will find that in comparison with similar conditions elsewhere he will have few restrictions to contend with, and in practically no case are these such as seriously to increase the cost of his operations. It is to permit such permanent use of the land that concessions are granted over such large areas, often consisting of

100 square miles or more. The Philippine Government sells its timber cheap—at half and less than half the stumpage prices asked for similar woods in neighboring tropical countries. It costs nothing to secure a concession—evidence of good faith is all that is required. It may be mentioned that the stumpage is collected as the timber is cut.

Sawmills.—At present there are about 70 sawmills of all sizes and descriptions operating in the Islands, about 12 of which can be compared to the average modern sawmills in the United States. The largest sawmills are located on timber concessions, while the others are operated under short-term licenses. The total cut of the mills of the Philippine Islands is about 65 to 70 million board feet per year.

A company properly equipped and managed and operating in a suitable tract should be able to deliver many kinds of native lumber in Manila at a cost of about half the prevailing market prices. The commercial forests are found either along the coasts where the timber can be skidded directly to the beach and loaded in suitable harbors, along navigable and floatable rivers where it is skidded directly to the water and floated or rafted down stream, or at a short distance inland where short logging railroads are advisable or necessary. For such timber as is close to the beach or large rivers, logging is easy and cheap, requiring but little capital. In these forests there are already a large number of operators, most of whom cut only small quantities of timber. The shipping of timber to the market from isolated sawmills in the Philippines involves considerable difficulty and expense and the lumberman who does not own his own interisland transportation is decidedly handicapped. Few interisland steamers are adapted for carrying lumber and freight rates are high and sometimes prohibitive. A company operating on a large scale should therefore provide its own means of transportation to the Philippine markets or else make provision for loading export stock direct to ocean-going vessels at the mill. With such privately owned interisland transportation the lumber ought to be carried to Manila for from $3.50 to $4.50 United States currency per 1,000 board feet, or even less. Freight rates from Manila to the Pacific coast vary from $7 to $8 United States currency per ton (logs), or from $10 to $14 per 1,000 board feet. There are no export duties on timber or manufactured products. Sawmill and logging machinery from the United States can enter duty free, and timber and logs are admitted to the United States without customs charges. Any mill with a capacity of 1,000,000 feet or more per month of export material is in a position to ship directly to the United States and other countries, thus saving the cost of transportation to Manila and reshipment.

Labor conditions.—The Filipino has a natural aptitude for running machinery and is easily taught. Given a good, experienced foreman it is surprising how well a Filipino crew can handle a sawmill. They work for small wages—from $0.25 to $0.75 United States currency per day for unskilled labor—and if they are accorded fair treatment they make steady and permanent workmen. In the thinly settled forest regions it is necessary to bring in labor from the more thickly settled provinces. To the lumberman the labor problem in the Philippines is not a difficult one. He will find that he has escaped many of the vexatious labor difficulties of the United States to meet comparatively few in the Philippine Islands. Patience and fair dealing will secure most excellent results.

Markets.—Approximately 80 to 100 million board feet of lumber are used each year in the Philippine Islands. Of this, strange to say, a considerable amount is imported, although the amount of such imported lumber is steadily being lessened as the capacity of the Philippine mills increase. China, Japan, and Australia use yearly more than 200 million board feet of American lumber, a large part of which could be furnished by lumber companies in the Philippines if there were a sufficient number properly capitalized and equipped. A market for Philippine lumber has already been secured in the United States and to a lesser extent in Europe. As already stated, many Philippine timbers are unexcelled for interior finish, cabinetwork, and other special uses for which imported woods are coming to be more and more demanded in the United States and Europe as the local supplies of hardwoods diminish.

MINOR FOREST PRODUCTS

This term includes all products of the forest except timber or lumber. Many of the minor forest products of the Philippines are at present almost unknown in the world's markets and are largely confined to local use. They are developed under a system of licenses issued by the Bureau of Forestry very much as in the case of timber. Forest charges amount to 10 per cent of the local market value. Among the minor forest products which are more or less generally used throughout the Islands and which have export possibilities are the following:

Nipa products.—Nipa is a palm that grows on the tidal flats along the seacoast. Nipa areas, or nipales as they are called locally, vary in extent up to about 20,000 acres; although there is one area which is estimated to embrace about 45,000 acres, only one-third of which, however, is

being utilized at present. Nipa sap has the important distinction of being the cheapest raw material known in the world for making sugar and alcohol. After extraction from the flower stalk this sap is known as "tuba" and contains about 15 per cent of sugar when fresh. Investigations made by the Philippine Bureau of Science bear the definite conclusions that nipa sugar is equal to cane sugar and can be extracted cheaper, as no crushing machinery is necessary; also that a hectare (2.47 acres) of nipa will produce 10,428 kilos (22,942 pounds) of sugar which, valued at $0.08 United States currency a kilo (2.2 pounds), would yield an annual income of more than $800 United States currency.

The yield of alcohol varies, depending on the grade of the product. It has been found that a hectare of nipa (about 2,000 plants) will average 86,000 liters (21,500 gallons) of sap per year; and that from 16 liters (4 gallons) to 30 liters (7.5 gallons) of sap are required to produce 1 liter of alcohol.

Nipa alcohol was awarded the first prize for purity at the Paris Exposition.

The use of alcohol of 186 proof, mixed with 10 per cent gasoline, has been shown to be of equal effectiveness with pure gasoline in a year's continuous trial in six automobiles in Manila. Manila imports about $200,000 worth of gasoline each year which could apparently be supplanted by alcohol.

On account of the opportunity for their utilization on a commercial scale, the products of the nipa palm must therefore be ranked among the most important minor forest products of the Philippines. All nipa growing on public land is under the supervision of the Bureau of Forestry; and up to the present time no forest charges on its products have been assessed.

Rattan.—Rattan is the product of the many species of climbing palms found in the tropical regions of the Old World. There is a large range of sizes, making the product adaptable to many uses. The thickness varies from one-quarter of an inch to 2 inches, and a length of 200 feet is not unusual. The larger sizes are used for canes and furniture, while the smaller ones are split to secure the outer part for caning chairs and the inner part or "core" for wicker furniture. The very small sizes are used in making baskets and other similar work. There are probably no finer rattans in the world than those which grow in the Philippine Islands. This is an industry as yet but little developed, as with a limited exportation, the local consumption is only about 6½ million pounds per annum. During the fiscal year

ended June 30, 1914, unmanufactured rattan to the value of $4,240.56 United States currency was exported, of which the exports to the United States made up only $397. The importation of rattan into the Philippines for furniture manufacture is nearly four times greater. Locally the chief uses are for tying bales of hemp, tobacco, and other agricultural products. Especially since the European war has interfered with the Singapore market for rattan, the world's demand is directed more and more to the Philippines, and there is an exceptional opportunity for developing an extensive business in the Islands.

Manila copal or almaciga.—This gum, or resin, is obtained from a tree of the pine family known as *Agathis alba* and is commonly known in the Philippines as almaciga. The dried gum is very similar in appearance to amber and varies in color from light yellow to almost black. Its principal use is for the well-known copal varnish used in high-grade work such as on coaches and automobiles. The best quality is at present obtained from accumulated deposits at the bases of trees. Large lumps of almaciga, often weighing 100 pounds, can be found after all traces of the tree have disappeared. Locally it is graded according to purity into three or more classes. Although there is no organized or well-developed business in Manila copal, the Philippine Islands exported a quantity valued at $54,564 United States currency in 1913. The world's requirements for this product are still far from being met. This shortage could largely be reduced by the development of large forest tracts in the Philippine which produce Manila copal, or almaciga.

Other resins, gums, and oils.—Many trees in the Philippine Islands yield resins and oils of high potential commercial importance, but up to the present time their use has been largely restricted within local limits. One gum in particular, known as *Manila elemi*, promises possibilities of high development. This is derived from a tree known botanically as *Canarium luzonicum*, and popularly as pili. In 1913, 281,729 pounds of this gum were exported.

Yacal yields a resin which, while considered inferior to almaciga, is often mixed with it when sold by the collectors at the trading stations. Shipments of yacal resin to Europe are not infrequent.

The lauans could also be tapped for resin, as all species of the family are more or less resinous.

Various species of apitong yield an oil, or more properly a semifluid resin, known as balao or panao.

Two species of Philippine pines, which are very similar to the yellow pines of the United States, have been tapped for

resin. They are found to be rich in turpentine, but at present it is not known whether they would justify exploitation on more than a very limited scale.

A true wood oil is derived from a tree of the Leguminosae (or locust family) known as supa or manapo, which is largely used by shipbuilders.

Lumbang oil is the product of the nuts of two species of Aleurites. These are closely allied to the trees from which the Chinese wood oil (candlenut or tung oil) is derived. This oil is highly valued by varnish manufacturers because of its transparency and quick-drying and noncracking qualities.

Tan barks.—The supply of hemlock and oak bark for tanning in the United States is no longer sufficient, and for many years there has been an increased importation of tanning materials from tropical countries, amounting now to about $6,500,000 per year. This consists chiefly of quebracho wood from South America, myrobolan nuts from India, mangrove bark from East Africa, gambier extract from Singapore, and bate, a chemical mixture, from Europe.

The Philippine Islands possess approximately 1,500 square miles of mangrove swamps, some of which are sufficiently extensive to warrant the erection of factories for the extraction of cutch, as the tanning material from the mangrove bark is called. A very important cutch industry has existed for years in the neighboring island of Borneo, and there is no reason why it should not be duplicated in the Philippines, especially in view of the fact that all Philippine products enter the United States free of duty.

Dyewoods and barks.—While a number of the woods, barks, and leaves of the trees and shrubs of the Philippines can be used for dyes, only one, sibucao (*Caesalpinia sappan*), is so used to any large extent. During the year 1913, 3,634,074 pounds of dyewoods, mostly sibucao, passed through official channels.

Nigi or tabigi (*Xylocarpus obvatus*) is a tree which is found in abundance in the mangrove swamps and the bark of which is used extensively for dyeing. There is no export trade in this bark, but it is used locally for dyeing sails, ropes, fishnets, cloth, etc.

Gutta percha and rubber.—Mindanao and other southern islands of the Philippine Archipelago furnish gutta percha of good grade and some rubber. The trees grow in the dense tropical forest and steps have been taken by the Bureau of Forestry to conserve them for a permanent yield. In 1913, although there was no organized collection of these products, 38,761 pounds, valued at $40,932 United States currency, were exported from the Philippines.

Paper pulp.—The various kinds of bamboo found in the Philippine Islands are probably put to more uses than any other single product. The domestic and industrial uses of bamboo are too numerous to mention. It has been found that one kind of bamboo in particular, namely caña-boho, is an excellent material for paper pulp, the cost of production being lower than that of wood pulp, while the quality is excellent. Surveys made by the Bureau of Forestry show that there is a sufficient amount of caña-boho in several localities to supply a pulp mill constantly with raw material. This is a matter which justifies very serious consideration on the part of paper manufacturers in the United States and Europe.

Fiber plants.—The number of fiber plants through the fields and forests of the Philippines is large. Many industries using such products may be developed in the Islands. The stems, petioles, midribs, leaves, air roots, and fibers from the stems and leaves are utilized for making baskets, hats, mats, ropes, textiles, etc. Among the plants used for this purpose are ferns, pandans, grasses, bamboos, sedges, palms, rattans, vines, and various other plants. The ferns are largely used for basket making; the pandans for mats, hats, and baskets; the bamboos and rattans for baskets and hats; and various palms for baskets, hats, and ropes. Sedges are made into baskets, mats, and ropes. Textiles are made from the fibers of pineapple leaves and from hemp. A fiber from a plant known as salago is exported to Japan where it is used in the manufacture of the best grade of bank notes.

All of the plants above mentioned have many other uses.

Soap barks.—There are many trees and vines in the Philippine Islands the bark of which has soaplike properties. The bark most commonly used for this purpose is that of the vine gogo (*Entada scandens*). This vine is abundant in all the forests of the Philippines. It is easily prepared by macerating and drying. Its most general use is for shampooing hair. Other soapy barks are available, but are less desired than gogo, of which about 2,000,000 pounds are collected annually.

Pili nuts.—These grow on the large forest tree known as pili (*Canarium luzonicum*) which is common in southern Luzon and neighboring islands. It is the general opinion of all who have tasted it that this nut deserves a place among the world's best table delicacies. Very little has been done in attempting to export the nut commercially or to improve the grade, although it is a prime favorite on Manila tables. Very few trees have been planted. The nut is used largely for confectionery by the Filipinos; and by

visitors to the Philippines is generally considered superior to almonds. There is, however, some exportation for foreign use. During 1913, 635,921 pounds of nuts, valued at $22,269, were exported to the United States.

There are many fruits, spices, and other nuts used locally as food, but none of them have become as well known or as popular as pili nuts.

Wax.—The outlying districts in the Philippines furnish honey and beeswax in large quantities for sale in the neighboring towns. The supply is rather irregular, and the wax is principally used locally for making candles. Besides this local consumption, 60,931 pounds of beeswax, valued at $14,403, were exported to the United States in 1912.

Medicinal plants.—The number of plants used for medicinal purposes in the Philippines is very large. A few are recognized as sources of standard medicines, but the number having commercial value is decidedly small. From one, the St. Ignatius bean (*Strychnos ignatii*), the strychnine of commerce is extracted. Some of the other plants having medicinal properties are dita, datura, sibucao, macabuhay, bonduc, pili, and Aleurites sp.

Horticultural possibilities of wild plants.—One of the largest fields for investigative work in the Philippines is presented by the possibilities of developing, improving and utilizing plants now growing wild in the forests. Experiments with many of these plants have already been made and the results have shown that very beautiful flowers and shrubs for decorative purposes and fruits of very fine flavor can be obtained. There are undoubtedly many other plants and trees which will show satisfactory results. Some of the fruits of forest trees that are regarded with favor are santol, mabolo, duhat, wild mango, catmon, alupag, and the Philippine species of Chinese nut or litche.

More detailed information available.—The scope of a paper of this kind necessarily prevents more than a mention of the possibilities partially developed or latent in the forests of the Philippines. More detailed information will gladly be furnished by the representatives of the Bureau of Forestry in the Exposition Grounds, or else by application to the Director of Forestry, Manila.